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THE STARS MY DESTINATION

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By
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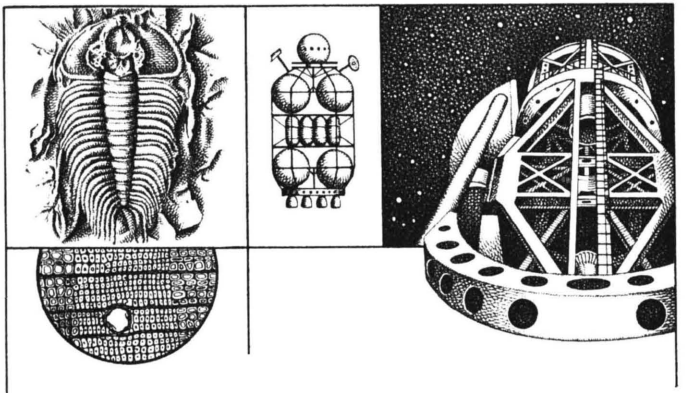
AND
OTHER STORIES



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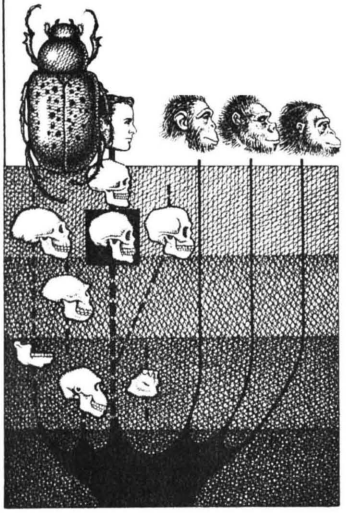


By WILLY LEY

THE ANIMAL IN THE FOOTNOTES

ON THE 12th of November, 1850, an unknown animal entered the annals of science in the most dignified and respectable manner possible. In the evening of that day, a meeting of the Royal Zoological Society of London took place and the main paper was read by Dr. Gideon Algernon Mantell, a famous geologist and paleontologist. Doctor Mantell had news from New Zealand, which had been

sent to him by his own son, who had been collecting.

The main news of the evening dealt with a bird.

A few years earlier, Walter Mantell had sent the remains of a bird to his father, stating that this must be the bird which was called Moho by the Maoris of the North Island and Takahe by the Maoris of the South Island.

The Maoris had said that this bird could not fly, even though it had wings. They had described it and said that they had eaten it while it was still around. After scientific examination of the remains it had been called *Notornis mantelli.*

But now, Dr. Mantell was able to announce, something could be added: *Notornis mantelli* was still alive. At any event, his son had secured the carcass of a freshly killed bird. It was about the size of a goose.

AS many readers may know, this Takahe was thought to be extinct since about 1900, but was discovered alive on the west shore of Lake Te Anau on the South Island. It is now as strictly protected as is humanly possible.

But Dr. Mantell had more news to tell that night:

It may not be irrelevant to add, that in the course of Mr. Walter Mantell's journey from Banks' Peninsula along the coast to Otago, he learnt from the natives that they believed there still existed in that country the only indigenous terrestrial quadruped, except a species of rat, which there are reasonable grounds for concluding New Zealand ever possessed. While encamping at Arowenua in the district of Timaru, the Maoris assured him that about ten miles inland there was a quadruped which they called Kaureke, and that it was formerly abundant, and often kept by their ancestors in a domestic state as a pet animal. It was described as about two feet in length, with coarse grisly hair; and must have more nearly resembled the Otter or Badger than the Beaver or the Ornithorhynchus (platypus), which the first accounts seemed to suggest as the probable type. The offer of a liberal reward induced some of the Maoris to start for the interior of the country where the Kaureke was supposed to be located, but they returned without having obtained the slightest trace of the existence of such an animal; my son, however, expresses his belief in the native accounts, and that if the creature no longer exists, its extermination is of a very recent date.

This is the earliest printed statement in which the mysterious mammal is even mentioned. An earlier writer on New Zealand's natural history, Ernest Dieffenbach, M.D., the naturalist of the New Zealand Company, had stated in his book *Travels in New Zealand* (London, 1843) that "no terrestrial beast has been found wild in these Islands, nor do any appear to be known to the natives."

The fact is that the only native mammals of New Zealand are two bats. One of them is closely related to an Australian form; the other is typical for New Zealand only. Locally, they are distinguished as the long-tailed and the short-tailed bat, with the explanation that the long-tailed bat has short ears while the short-tailed bat is long-eared.

THE Maoris told that when they arrived in Ao-tea-roa ("long white cloud" or "long shining land," their name for New Zealand) from Hawa-iki (their original home, most probably the island of Raiatea, about 120 miles to the northwest of Tahiti) in the canoes Tainui, Takitimu, Te Arawa, Mata-atua, Kurhaupo and Tokomaru they brought dogs with them which they kept as livestock. The main wave of the Maori migration to New Zealand must have been around 1350 A.D., but the dog, now extinct, was still mentioned by Captain James Cook as one of the two mammals he saw. The other was a black rat which was rare even then — the Maoris ate it, too.

I have to digress from Dr. Mantell's unknown "indigenous terrestrial quadruped" for a moment to say a little more about that black rat. No doubt it was there, for it even received a scientific name, *Mus maorium*, or Maori rat. The Maori name for it was Kiore.

But one expert claimed around 1860 that he could not find a difference between the Maori rat and the common Pacific species of rat *Mus exulans*. And Alfred Russell Wallace points out in his once-famous book *Island Life* (London, 1892) that whenever a man caught a black rat and the Maoris jubilantly declared that this was a true Kiore (in the meantime, other European rats had arrived by ships from England, much against the wishes of everybody), it turned out to be either a European black rat or else an Australian rat which had arrived as a stowaway on ships from Australia.

The story of Dr. Mantell's unknown quadruped moved on to several other names. The name of the explorer in question is now in most books as Sir Julius von Haast, but he was born in Bonn on the Rhine (where his father was Burgomaster) as Johann Franz Julius von Haast. And he did not see New Zealand until the age of 36, when he arrived in Auckland on December 21st, 1858.

He became famous as a geologist. He discovered an important pass through the mountains of the South Island which still bears his name. He located coal and gold and founded the Philosophical Institute of Canterbury, New Zea-

land. But he kept telling friends that, because of his beautiful and strong voice, he had wanted to become an opera singer — presumably his dignified father had something to say about that ambition — and that he had played the violin in the symphony orchestra of Düsseldorf under the baton of Felix Mendelssohn.

Sir Julius learned a new name for the unknown mammal. The Maoris called it Waitoreke, or Waitoreki, or Waitoteke. I haven't been able to find out anywhere whether this name can be translated, but I found in Dieffenbach a glossary of Maori words and learned that *waipa* means river, *waikeri* means either swamp or rivulet, *wairere* means waterfall, *waikare* means clear water and *waitangi* (a place name) means noisy water.

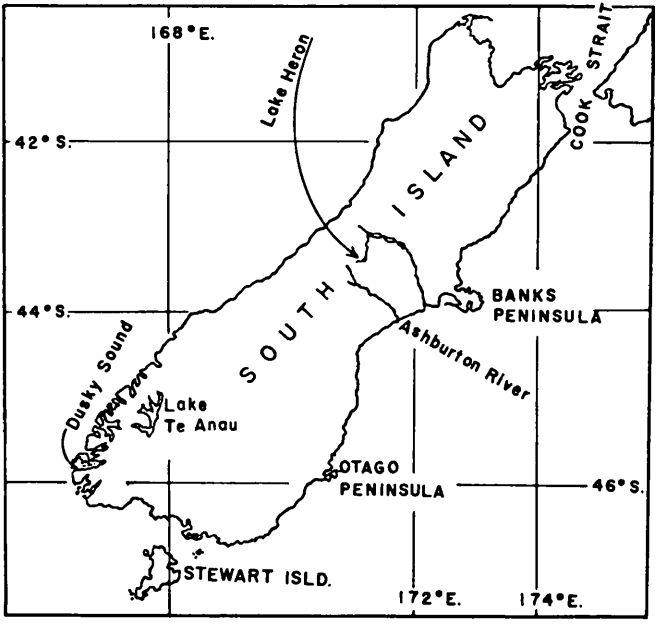
Waitoreke obviously has something to do with water. Maybe the name just means "lives in water" or something like that.

IN 1857, the Austrian geologist Ferdinand von Hochstetter embarked on the *Novara* for a long trip of exploration. He came to New Zealand and made friends with Dr. Julius von Haast. Two years after his return to Austria, von Hochstetter started to assemble his notes on New Zealand for a book and asked von Haast whether anything new could be reported. The reply was printed in his book in a footnote reading:

> My friend Haast writes to me about the Waitoreki under the date of the 6th of June 1861 as follows: "3500 feet above sea level I saw at the upper Ashburton River (South Island, Province of Canterbury), in an area where no human foot ever walked before me, its tracks on many occasions. The tracks resemble those of our European otter but are somewhat smaller. The animal itself was seen by two gentlemen who own a sheep ranch at the shore of Lake Heron in the neighborhood of the Ashburton River at an elevation of 2100 feet above sea level. They describe the animal as being of a dark brown color, of the same size as a large rabbit. They hit it with a whip; it emitted a whistling sound and disappeared quickly in the water along the reeds."

That footnote was the sum total that Dr. von Hochstetter (or rather Dr. von Haast) could report. Even at a later date, during the official Inaugural Address at the occasion of the founding of the Philosophical Institute of Canterbury, Sir Julius could not claim to have ever seen the animal. But he repeated that he had seen its tracks many times.

Meanwhile, the animal had made its appearance in another footnote. In 1855, a London publishing house printed a book by the Reverend Richard Taylor, entitled *Te Ika A Maui, Or, New Zealand and its Inhabitants.* The



footnote on p. 394 reads in full:

A man named Seymour, of Otaki, stated that he had repeatedly seen an animal in the Middle Island, near Dusky Bay, on the south-west coast, which he called a musk-rat, from the strong smell it emitted. He said, its tail was thick, and resembled the ripe *pirori*, the fruit of the *kie-kie*, which is not unlike in appearance to the tail of a beaver. This account was corroborated by Tamihana te Rauparaha, who spoke of it as being more than double the size of the Norway rat, and as having a large flat tail. A man named Tom Crib, who had been engaged in whaling and sealing in the neighborhood of Dusky Bay for more than twenty-five years, said he had not himself seen the beaver, but had several times met with their habitations, and had been surprised by seeing little streams dammed up, and houses like bee-hives erected on one side, having two entrances, one from above and the other below the dam. One of the Camerons, who

lived at Kaiwarawara, when the settlers first came to Wellington, stated that he saw one of these large rats and pursued it, but it took to the water, and dived out of sight.

THE two comments which may have to be made to clear up a few question marks in the reader's mind are that for a while the South Island was called Middle Island (the one now called Stewart Island was then named South Island), while the Norway rat mentioned is the common European brown rat, which can be of considerable size itself.

As time went on, reports about the Waitoreke became rarer and rarer. In other words there weren't any, and books about New Zealand or about natural history followed the style started by Ferdinand von Hochstetter: the Waitoreke began to dwell exclusively in footnotes.

But naturalists would have given almost anything to find out whether it lived in New Zealand lakes and rivers, too. For in the meantime, the facts of life, evolution, had been realized and a New Zealand mammal held high promises just because of its location.

The earliest known mammals were the monotremes, platypus and two types of echidna, known from Australia and New Guinea. They had survived there, along with hosts of mammals of the next higher type, the marsupials, because their area had become separated from other land masses at a time when the marsupials were the highest mammals there were.

Now there was every indication that the land connection to New Zealand (via New Guinea) had broken down at an even earlier time. If there was an indigenous New Zealand mammal, it had to be very old and probably was a monotromelike platypus, sharing with it the habit of dwelling near water, but not necessarily looking like it.

And since New Zealand had preserved a reptile, the Hatteria or Sphenodon, which was most decidedly "pre-dinosaur" in age, a New Zealand mammal might even have a bodily organization which could be called "pre-mammal." In short, it might be the scientific find of the century — provided it could be found.

The area where it might be found could be reasonably well localized. All reports, with a single doubtful exception, had come from the South Island, more specifically the southern half of the South Island.

Walter Mantell heard his story on the east coast of the South Island, to the south of Banks' Peninsula. Sir Julius von Haast had seen the tracks in the interior fairly far to the south. And Lake Heron — it is just about 1½ miles

long and not entered on most maps — might be said to be just about the center of the South Island.

Dusky Bay, of course, is almost at the southern end and I might add that Takahe was once taken near Dusky Bay and that the most recent (but more than a century old) report of a small moa also came from that area.

STRANGELY enough, the very first report — if it is one — also came from Dusky Bay. Again I have to quote a footnote, this time from p. 476 of Wallace's *Island Life.*

The animal described by Captain Cook as having been seen at Pickersgill Harbour in Dusky Bay (*Cook's 2nd Voyage*, Vol. I, *p. 98*) may have been the same creature. He says: "A four-footed animal was seen by three or four of our people, but as no two gave the same description of it, I cannot say what kind it is. All, however, agreed that it was about the size of a cat, with short legs, and of a mouse color. One of the seamen, and he who had the best view of it, said it had a bushy tail, and was the most like a jackal of any animal he knew." It is suggestive that, so far as the points in which "all agreed" — the size and the dark color — this description would answer well to the animal so recently seen [this is in reference to von Haast's Lake Heron story] while the "short legs" correspond to the otter-like tracks, and the thick tail of an otter-like animal may well have appeared "bushy" when the fur was dry. It has been suggested that it was only one of the native dogs; but as none of those who saw it took it for a dog, and the points on which they all agreed are not dog-like, we can hardly accept this explanation.

Sorry — this ends the story. The Waitoreke has not been found and the latest remark about it that I could find occurs in *The New Zealand Nature Book* by W. Martin, printed in Auckland, New Zealand, in 1930. It says there (for once *not* in a footnote), "Other than the two species of bats, New Zealand has no land mammals whatsoever, unless there be more truth than is generally believed in the persistent reports of a native otter."

MISSING INGREDIENT

SOME ten years ago, I worked as a research engineer for a company in the instrument business. The bread and butter of the firm was radio-sondes for the Weather Bureau, those little instrument packages containing a kind of thermometer, a device for measuring air pressure and a third one for measuring humidity, all three being hitched up with a radio transmitter so that the readings taken by the instruments aloft can be received and recorded on the ground.

The company also published a

weekly or biweekly company newspaper. One day, the lady in charge cornered me at lunch, wondering aloud—and in the presence of four witnesses—whether I might not be persuaded to write something for the company paper. I said yes without having any idea what I might write for them, but talks with some of the assembly line inspectors and one or two junior engineers taught me that nobody in the whole plant and only one man in the laboratory (its director) had any idea of the history of the radio-sondes they were making busily every day.

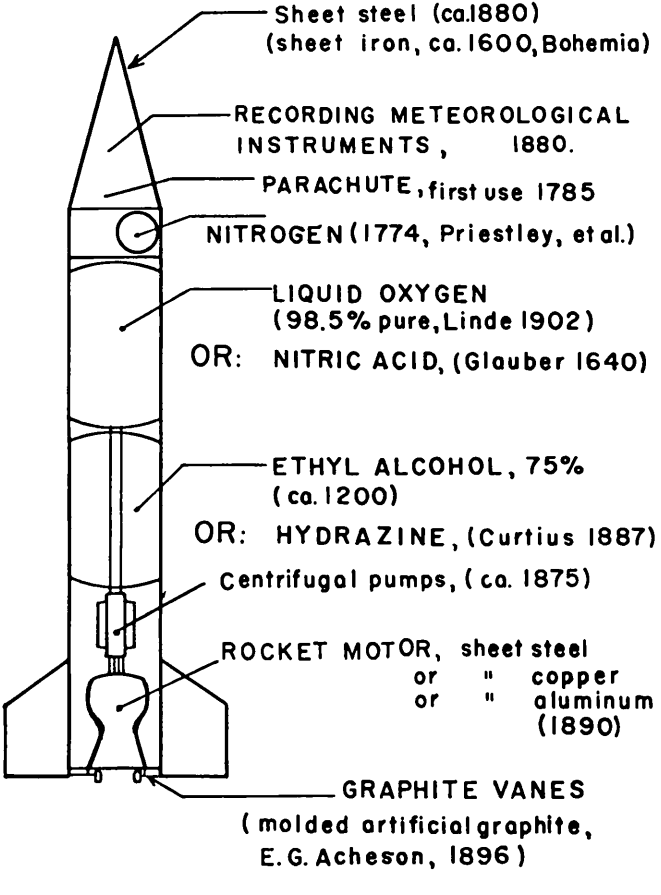
So I dug into both company records and meteorological literature and came up with a three-part article of how the radio-sonde had come into being. And while I was busily noting down events and dates, I found, to my own surprise, that the radio-sondes they began making in 1929 or thereabouts could have been manufactured as far back as 1914. Not all the component parts which were actually used had been available in 1914, but other components, which could have done the same job, had been at hand.

I am not trying to change the theme—quite the contrary—but I now have to mention that the first liquid-fuel rocket to lift itself off the ground did so in Massachusetts in 1926. And the first really large liquid-fuel rocket to work successfully was one of the early V-2 rockets; the date was October 3rd, 1942. But when you look at a liquid-fuel rocket, you also find that most components (or materials) had been around many years prior to those dates. It would actually have been possible to send a liquid-fuel rocket to an altitude of at least 30 miles half a century ago, in 1906.

The diagram shows a simplified cross section through a large liquid-fuel rocket of the type of V-2 or Viking. Let us begin at the top and see what the parts are and how they work.

The very nose of the rocket is conical, usually made of sheet steel, and it houses the instruments which constitute the "payload." As for the sheet steel, it became available in 1880 and the same year may be held to apply for recording meteorological instruments. Of course there would be no great difference if the skin were sheet iron instead of sheet steel and that is almost three centuries older.

NATURALLY, since the year we have in mind is 1906, these instruments could not have broadcast their findings; radio was in existence, but it had a long way to progress until it could be used for this purpose. However, it


Sheet steel (ca.1880)
(sheet iron, ca. 1600, Bohemia)
RECORDING METEOROLOGICAL INSTRUMENTS, 1880.
PARACHUTE, first use 1785
NITROGEN (1774, Priestley, et al.)
LIQUID OXYGEN
(98.5% pure, Linde 1902)
OR: NITRIC ACID, (Glauber 1640)
ETHYL ALCOHOL, 75%
(ca. 1200)
OR: HYDRAZINE, (Curtius 1887)
Centrifugal pumps, (ca. 1875)
ROCKET MOTOR, sheet steel
or " copper
or " aluminum
(1890)
GRAPHITE VANES
(molded artificial graphite,
E.G. Acheson, 1896)

would have been possible to eject the instrument package with the aid of a timing device and parachute it to the ground. The first recorded use of a parachute took place in 1785, when Monsieur Blanchard dropped a dog from the gondola of his balloon. (He tried it on himself in 1793, but Leonardo da Vinci had sketched this about 1510.) Of course there were timing devices and "infernal machines" around at the same time.

The next section below the nose cone holding the payload is usually the section containing the rocket instruments. What we use now did not exist in 1906, but an engineer could have rigged up a gyro, driven, say, by compressed nitrogen.

But if you just want a vertical or near-vertical flight, you do not need this section at all. That a liquid-fuel rocket can function without it and produce a fine vertical flight was once accidentally proved by an Aerobee rocket. The Aerobee has no "guidance," relying instead on what is called "arrow stability." But until this unforeseen event took place, everybody would have agreed that the rocket needed the push from the solid-fuel booster to acquire enough arrow stability.

Well, in this particular case, a valve misbehaved, the Aerobee began working, left its solid-fuel booster behind in the launching rack and climbed peacefully to nearly 20 miles.

Next section in the rocket is the tank for the oxidizer. Big rockets like Viking and V-2 use liquid oxygen, available since 1902. Smaller rockets like the Aerobee use nitric acid, available for centuries.

The next tank is the fuel tank. Again the big rockets use 75 per cent ethyl alcohol, which Italian monks started distilling about 1200. Or you may prefer hydrazine, which sounds enormously "modern" but was made for the first time in 1887. The tanks themselves are, of course, sheet metal and though nitric acid is hard on metals, it would have been no real problem in 1906 to devise a tank which could have held nitric acid for an hour or so.

BELOW the fuel tanks, you have the rocket motor. It has a shape which simply did not exist in 1906. But its shape is not so difficult that it could not have been made then. As for the material, you could use sheet steel or sheet copper or sheet aluminum, which became available in 1890. For the metal-forming techniques of 1906, sheet copper might have been the best bet, since there was not much practice yet in the handling and forming of aluminum.

If that rocket had worked on hydrazine and nitric acid, there would have been no problem with ignition, for this is a so-called hypergolic combination which bursts into flame spontaneously when the two liquids touch each other. For an alcohol-oxygen rocket, ignition is required—and the device used is a fireworks pinwheel inserted into the motor through the exhaust nozzle. A fireworks pinwheel could have been bought in Nuremberg in 1650.

As for getting the fuels from the tanks into the rocket motor, the modern practice is to have high-strength hydrogen peroxide decompose into steam, which drives a turbine, which in turn drives the centrifugal pumps. Centrifugal pumps began to be built commercially in about 1875. High-strength hydrogen peroxide did not become available until much later, but an engineer might have rigged up a different method of driving the fuel pumps. Or else he might just have pressurized both the fuel and the oxidizer tank with compressed nitrogen.

In short, all the materials, including the fuels, for a vertical rocket shot into the stratosphere were available in 1906. The few things which were not directly available were within easy reach of the engineering methods of the time.

But, as we well know, nobody even tried to build a liquid-fuel rocket in 1906. The fuels and materials were there. General engineering practice existed, too. So did the necessary mathematics to calculate whatever needed calculating. But it wasn't done. It couldn't be done because nobody had *said* that it could be done.

There was one ingredient missing and it happens to be the most important one. There was no theory.

ICEBERGS FOR LOS ANGELES

SOMEBODY, somewhere, must have published the idea that Los Angeles might be supplied with drinking water by means of towing icebergs from Antarctica to Long Beach and allowing them to melt after they got there. Icebergs, being originally compacted snow, consist of fresh water; that much is certain. I don't know whether Los Angeles is short of drinking water to the extent of considering such plans. In fact, I don't even know how that proposal reads in detail.

All I know is that a reader asked me whether this idea is feasible at all or whether an iceberg, towed such a distance through equatorial seas, would melt en route. This is a question to which one can attempt to find an answer. It so happens that

there is some practical experience with the towing, not of icebergs, but of rather bulky objects.

The objects were large log rafts which were towed along the Pacific shore of the United States from Seattle to San Diego. The log rafts were more than 1000 feet long, with a width of around 60 feet. Their weight amounted to 15,000 tons and they had a draft comparable to a very large ocean liner, namely 28 feet. It took only one ocean-going tug with a 1000 horse-power engine to tow them; of course, since they did not make much speed, they needed about two weeks for the 1400-mile trip.

It is important to mention that the practical experience did not consist of just one such tow. If there had been only one, we might with much justification conclude that everybody happened to be very lucky. But in the course of a few years, 118 such rafts were assembled in Seattle and only three of the 118 failed to reach San Diego. Two of them came apart en route because the chains which held them together broke in several places. The third one had to be abandoned because it caught fire—don't ask me how.

The main lesson learned from all this was that large and bulky buoyant objects can be towed over long distances with comparatively little engine power if a slow speed is acceptable.

Now we can go back to the proposed towing of icebergs. If you travel along the 118th western meridian, you would reach the shore of Antarctica at about a southern latitude of 70 degrees. No land, not even an island, would get in the way along that meridian. The distance that would have to be traveled is, in round figures, 9000 miles. If you assume a towing speed of 5 mph, you'd cover a distance of 120 miles in 24 hours. The time needed to get the iceberg from Antarctica to Long Beach, California, would therefore be 75 days.

It is well known that a large mass of solid ice is rather resistant to melting, but whether an iceberg would last for approximately 45 days being towed through warm seas is something that can really be decided only by experiment. And what you do with the iceberg after you get it where you want it is another little problem I don't care to tackle at the moment.

—WILLY LEY

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